

CLAIMS

1. An injection-molding method for covering a plate-shaped member having a through hole reaching from a front face to a rear  
5 face with a molded layer by injection-molding, the injection-molding method comprising:

a step of preparing a first die having a gate that will face the through hole and a front side cavity face that will face the front face of the plate-shaped member, a second die having a receiving face for receiving the rear face of the plate-shaped member and a pin for blocking the through hole, and a third die having a rear side cavity face that will face the rear face of the plate-shaped member;

a step of sandwiching the plate-shaped member with the first die and the second die and forming a front side cavity with the front side cavity face of the first die and the front face of the plate-shaped member;

a step of molding a front side molded layer to the front face of the plate-shaped member by injecting a molding material such as resin through the gate into this front side cavity;

a step of opening the through hole and forming a front side cavity with the rear side cavity face of the third die and the rear face of the plate-shaped member by replacing the second die with the third die; and

25 a step of molding a rear side molded layer to the rear face of the plate-shaped member by piercing the front side molded layer with an injection pressure injecting molding material through the

gate and filling the rear side cavity with molding material by way of the through hole.

2. An injection-molding apparatus constructed to mold a front  
5 side molded layer to a front face of a plate-shaped member by sandwiching the plate-shaped member with a first die and a second die being closed and thereby forming a front side cavity with the front face of the plate-shaped member and the first die and filling this front side cavity with a molding material such as resin and  
10 to mold a rear side molded layer to the rear face of the plate-shaped member by replacing the second die with a third die and sandwiching the plate-shaped member with the third die and the first die and thereby forming a rear side cavity with the rear face of the plate-shaped member and the third die and filling this  
15 rear side cavity with a molding material such as resin, the injection-molding apparatus being characterized in that:

20 a gate for injecting molding material into the front side cavity and the rear side cavity is provided in the first die and this gate is made to face a through hole formed in the plate-shaped member;

a receiving face for making contact with the rear face of the plate-shaped member is provided on the second die and a pin able to fit in the through hole is provided on the receiving face; and

25 to replace the second die with the third die, moving means are provided for moving the second and third dies between a facing position facing the first die and a withdrawn position away from

the first die.

3. An injection-molding apparatus according to claim 2,  
characterized in that a support projection for supporting the  
5 plate-shaped member by abutting with it near the through hole is  
provided on the third die.

4. An injection-molding method for covering a front face and a  
rear face of a plate-shaped member with a molded layer by  
10 injection-molding, the injection-molding method comprising:

a step of preparing a first die having a front side cavity  
face that will face the front face of the plate-shaped member and  
a first gate opening at this front side cavity face and a first  
pressure sensor fronted on the front side cavity face and preparing  
15 a second die having a rear side cavity face that will face the  
rear face of the plate-shaped member and a second gate opening  
at the rear side cavity face and a second pressure sensor fronted  
on the rear side cavity face;

a step of sandwiching the plate-shaped member with the first  
20 die and the second die and thereby forming a front side cavity  
with the front side cavity face of the first die and the front  
face of the plate-shaped member and forming rear side cavity with  
the rear side cavity face of the second die and the rear face of  
the plate-shaped member;

25 a step of injecting a molding material such as resin through  
the first gate into the front side cavity and injecting a molding  
material through the second gate into the rear side cavity; and

a step of stopping the injection of molding material into the front side cavity when a measured value of the first pressure sensor reaches a prescribed value and stopping the injection of molding material into the rear side cavity when a measured value  
5 of the second pressure sensor reaches a prescribed value, to mold front and rear side molded layers respectively in the front and rear side cavities.

5. An injection-molding apparatus constructed to sandwich a  
10 plate-shaped member with first and second dies and thereby form a front side cavity with a front face of the plate-shaped member and the first die and form a rear face cavity with a rear face of the plate-shaped member and the second die and fill the front and rear side cavities with a molding material such as resin to  
15 mold a front side molded layer to the front face of the plate-shaped member and mold a rear face molded layer to the rear face of the plate-shaped member, the injection-molding apparatus being characterized in that:

in the first die it has a first gate fronting on the front  
20 side cavity and a first pressure sensor for measuring the internal pressure of the front side cavity;

in the second die it has a second gate fronting on the rear side cavity and a second pressure sensor for measuring the internal pressure of the rear side cavity; and

25 it has control means for stopping the injection of molding material into the front side cavity on the basis of a signal from the first pressure sensor when the internal pressure of the front

side cavity has reached a prescribed value and stopping the injection of molding material into the rear side cavity on the basis of a signal from the second pressure sensor when the internal pressure of the rear side cavity has reached a prescribed value.

5

6. An injection-molding method for covering a front face and a rear face of a plate-shaped member with a molded layer by injection-molding, the injection-molding method comprising:

a step of preparing a first die having a front side cavity face that will cover the front face of the plate-shaped member and a first gate opening at the front side cavity face and a second gate avoiding the front side cavity face and switching means for guiding molding material to either one of the first and second gates, preparing a second die having a receiving face for receiving the rear face of the plate-shaped member, and preparing a third die having a rear side cavity face that will cover the rear face of the plate-shaped member and a connecting passage that will cause the second gate to open at the rear side cavity face;

a step of sandwiching the plate-shaped member with the first die and the second die and forming a front side cavity with the front side cavity face of the first die and the front face of the plate-shaped member;

a step of injecting a molding material such as resin through the first gate into the front side cavity to mold a front side molded layer;

a step of replacing the second die with the third die and thereby forming a front side cavity with the rear side cavity face

of the third die and the rear face of the plate-shaped member; and

a step of injecting a molding material through the second gate and the connecting passage into the rear side cavity to mold  
5 a rear side molded layer.

7. An injection-molding apparatus constructed to mold a front side molded layer to a front face of a plate-shaped member by closing first and second dies and sandwiching the plate-shaped  
10 member and thereby forming a front side cavity with the front face of the plate-shaped member and the first die and filling this front side cavity with a molding material such as resin and to mold a rear side molded layer to a rear face of the plate-shaped member by replacing the second die with a third die and sandwiching the  
15 plate-shaped member with the third die and the first die and thereby forming a rear face cavity with the rear face of the plate-shaped member and the third die and filling this rear face cavity with molding material, the injection-molding apparatus being characterized in that:

20 the first die is provided with a first gate facing the front side cavity and a second gate avoiding the rear side cavity and switching means for guiding molding material to either one of the first and second gates;

the second die is provided with a receiving face for making  
25 contact with the rear face of the plate-shaped member;

the third die is provided with a connecting passage for connecting the second gate to the rear side cavity; and

to replace the second die with the third die, moving means are provided for moving the second and third dies between a facing position facing the first die and a withdrawn position away from the first die.

5

8. An injection-molding apparatus according to claim 2, claim 3 or claim 7 characterized in that the front side cavity and the rear side cavity are formed so that the front side molded layer and the rear side molded layer are made to extend as far as the  
10 outer edge of the plate-shaped member and the two layers are brought into contact.